

Cinemática

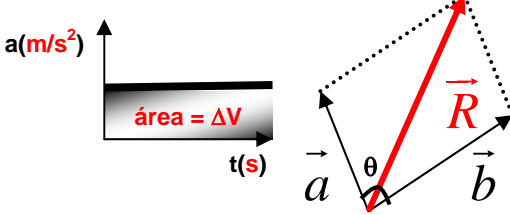
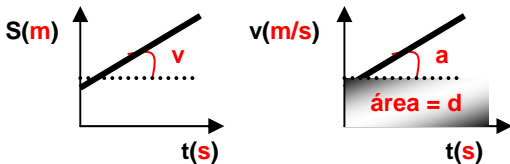
$$V_{méd} = \frac{d}{t} \quad V_{méd} = \frac{\Delta S}{\Delta t} \quad d \neq \Delta S$$

$$1 \frac{m}{s} = 3,6 \frac{km}{h} \quad a_{méd} = \frac{\Delta V}{\Delta t} \quad g \cong 10 \frac{m}{s^2}$$

$$d = V_o t + \frac{at^2}{2} \quad S = S_o + V_o t + \frac{at^2}{2}$$

$$V = V_o + at \quad V^2 = V_o^2 + 2ad$$

$$V = V_o \pm gt; h = V_o t \pm \frac{gt^2}{2}; V^2 = V_o^2 \pm 2gh$$



$$R^2 = a^2 + b^2 + 2ab \cos \theta$$

$$\vec{a} = \vec{a}_t + \vec{a}_c \quad a_c = \frac{V^2}{R} = \omega^2 R \quad T = \frac{1}{f}$$

$$V = \frac{d}{t} = \frac{2\pi R}{T} = 2\pi R f \quad \omega = \frac{2\pi \text{ rad}}{T} = 2\pi f$$

$$V = \omega R \quad \vec{V}_{\text{Resultante}} = \vec{V}_{\text{Relativa}} + \vec{V}_{\text{Arrastamento}}$$

$$\sin \theta = \frac{\text{da frente}}{\text{maior}} \quad \cos \theta = \frac{\text{do lado}}{\text{maior}}$$

$$A = \frac{V_o^2 \sin 2\theta}{g}; h_{\text{máx}} = \frac{V_o^2 \sin^2 \theta}{2g}$$

Leis de Newton

MRU
1ª) ou \Rightarrow Equilíbrio $\Rightarrow F_{\text{Res}} = 0$
Repouso

2ª) $\vec{F}_{\text{Res}} = m\vec{a}$ $\vec{P} = m\vec{g}$ $1 \text{ kgf} \cong 10 \text{ N}$

3ª) Ação e Reação

$$f_{\text{at máx}} = \mu_E N; f_{\text{at cin}} = \mu_c N; \mu_E > \mu_c$$

$$f_{\text{ctp}} = m \frac{V^2}{R} = m\omega^2 R \quad |f_{\text{ctp}}| = |f_{\text{cfg}}|$$

Momento e Equilíbrio: Estática

$$\vec{T} = M_{\vec{F}} = F \cdot d \cdot \sin \theta \quad M_H = M_{AH}$$

$$F_1 \cdot d_1 = F_2 \cdot d_2 \quad \vec{P} \rightarrow \text{Centro de Gravidade}$$

Hidroestática

$$P = \frac{F}{A} \quad d = \frac{m}{V} \quad 1 \frac{g}{cm^3} = 10^3 \frac{kg}{m^3}$$

$$1 \text{ atm} = 76 \text{ cmHg} \cong 10^5 \text{ Pa} \left(\frac{N}{m^2} \right) \cong 10 \text{ m d' água}$$

$$P = P_o + dhg \quad P_1 = P_2 \Rightarrow \frac{F_1}{A_1} = \frac{F_2}{A_2}$$

$$E = P_{\text{liq}} = m_{\text{liq}} g = d_{\text{liq}} V_{\text{liq}} g$$

Gravitação

1ª) Elipses $2^a) A_1 = A_2 \Rightarrow T_1 = T_2$

$$3^a) T^2 \propto R^3 \quad F_G = \frac{GMm}{R^2} \quad g_{\text{sup}} = \frac{GM_T}{R_T^2}$$

$$g_h = \frac{GM}{(R+h)^2} \quad V = \sqrt{\frac{GM}{R+h}} \quad E_G = -\frac{GMm}{R}$$

Trabalho, Energia e Conservação

$$\tau = Fd \cdot \cos \theta \quad E_C = \frac{mV^2}{2} \quad \tau_{\text{Res}} = \Delta E_C$$

$$\tau_P = E_G = mgh \quad F_E = kx \quad \tau_E = E_E = \frac{kx^2}{2}$$

$$E_M = E_C + E_G + E_E \quad E_{M \text{ Final}} = E_{M \text{ Inicial}}$$

$$P = \frac{\tau}{t} = \frac{\text{energia}}{t} \quad P = F \cdot V \text{ (MRU)}$$

Impulso e Quantidade de Movimento

$$\vec{I} = \vec{F} \Delta t \quad \vec{Q} = m\vec{v} \quad \vec{I} = \Delta \vec{Q}$$

$$\vec{Q}_{\text{Final}} = \vec{Q}_{\text{Inicial}} \quad r = \frac{V_{\text{Afasta}}}{V_{\text{Aprox}}}$$

$$r = 1 \Rightarrow \text{elástica}; r = 0 \Rightarrow \text{inelástica}$$

Temperatura e Dilatação

$$T_F = 1,8 T_C + 32 \quad T_K = T_C + 273$$

$$\Delta l = \alpha l_o \Delta T \quad \beta \cong 2\alpha \quad \gamma \cong 3\alpha \quad \frac{\Delta l}{l_o} = \%$$

$$\Delta V_{\text{liq}} = \Delta V_{\text{recp}} + \Delta V_{\text{apr}} \quad \text{água: irregular}$$

Calorimetria e Mudança de Fase

$$Q = C \Delta T \quad Q = m c \Delta T \quad 1 \text{ cal} \cong 4,2 \text{ J}$$

$$\Sigma Q = 0 \quad Q = Lm \quad \phi = kA \frac{\Delta T}{l}$$

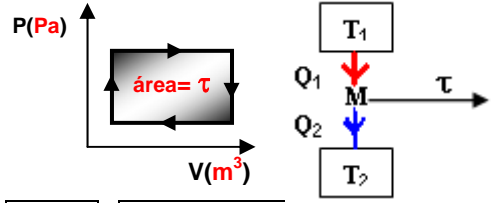
Gases

$$PV = nRT \quad \frac{PV}{T} = \frac{P_o V_o}{T_o} \quad \tau = P \Delta V$$

$$P = \frac{1}{3} \left(\frac{N}{V} \right) m \bar{v}^2 \quad \bar{E}_c = \frac{3}{2} kT \quad \bar{E}_c = \frac{3}{2} nRT$$

Termodinâmica

$$\Delta U = Q - \tau \quad \Delta U = \Delta E \quad \Delta S = \Delta \bar{Q} / T$$



$$r = \frac{\tau}{Q_1} \quad r = 1 - \frac{Q_2}{Q_1} = 1 - \frac{T_2}{T_1} \quad e = \frac{Q_2}{\tau}$$

Óptica

$$\hat{i} = \hat{r} \quad D = 2d \quad \beta = 2\alpha \quad n = \frac{360}{\alpha} - 1$$



$$\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o} \quad c = 3 \cdot 10^8 \frac{m}{s}$$

$$A = \frac{h_i}{h_o} = -\frac{d_i}{d_o} \quad n = \frac{c}{v} \quad \frac{v_1}{v_2} = \frac{\sin \theta_1}{\sin \theta_2}$$

$$n_1 \sin \theta_1 = n_2 \sin \theta_2 \quad \sin \theta_L = \frac{n_{<}}{n_{>}} \quad C = \frac{1}{f(m)}$$

$$\frac{1}{f} = \left(\frac{n_L}{n_M} - 1 \right) \left(\frac{1}{R_1} - \frac{1}{R_2} \right) \quad A = r + r' \quad D = \hat{i} + \hat{i} - A$$

$$f = -PR \quad 25 \text{ cm} \rightarrow PP \quad \frac{n_{os}}{n_{ob}} = \frac{d_i}{d_o}$$

Ondas e MHS

$$v = \lambda f \quad f_D = f \left(\frac{v \pm v_o}{v \pm v_F} \right) \quad v = \sqrt{\frac{T}{\mu}}$$

$$\Delta x = n \frac{\lambda}{2} \quad f_n = n \frac{v}{2\ell} = n f_1 \quad \lambda_n = \frac{2\ell}{n}$$

$$f_{2n-1} = (2n-1) \frac{v}{4\ell} \quad T = 2\pi \sqrt{\frac{m}{k}} \text{ ou } \sqrt{\frac{\ell}{g}}$$

$$x = A \cos(\omega t + \theta) \quad y = A \cos 2\pi \left(\frac{t}{T} - \frac{x}{\lambda} \right)$$

Eletrostática

$$Q = \pm ne \quad e = 1,6 \cdot 10^{-19} \text{ C} \quad \vec{E} = \frac{\vec{F}}{q}$$

$$F = \frac{k_o Q_1 Q_2}{d^2} \quad E = \frac{k_o Q}{d^2} \quad V_{AB} = \frac{\tau}{q} = \frac{E}{q}$$

$$V_{AB} = Ed \quad E_p = \frac{k_o Qq}{d} \quad V = \frac{k_o Q}{d}$$

$$E_{\text{Sup}} = \frac{k_o Q}{R^2} \quad C = \frac{Q}{V} \quad Q = \frac{R}{k}$$

$$C = \frac{\epsilon A}{d} \quad E = \frac{QV}{2} = \frac{CV^2}{2} = \frac{Q^2}{2C}$$

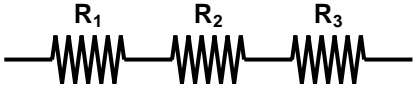
Eletrodinâmica

$$i = \frac{Q}{t} \quad R = \frac{\rho \ell}{A} \quad V = Ri \quad P = Vi$$

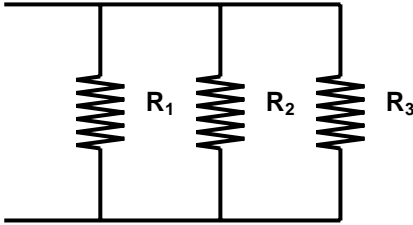
R = k ⇒ ôhmico **R varia ⇒ não ôhmico**

$$P = Ri^2 = \frac{V^2}{R} \quad V = \mathcal{E} - ri \quad r = \frac{P_U}{P_T}$$

$$P_T = P_U + P_D \quad i_{m\acute{a}x} = \frac{\mathcal{E}}{r} \quad V_{m\acute{a}x} = \mathcal{E}$$



$$R_T = R_{Eq} = R_1 + R_2 + R_3$$



$$\frac{1}{R_{Eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

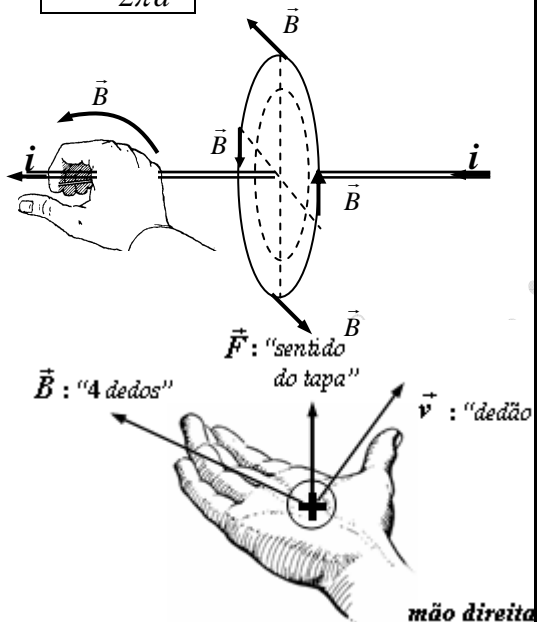
Capacitores ⇒ ao contrário

Eletromagnetismo

$$B = \frac{\mu_0 i}{2\pi r} \quad B = \frac{\mu_0 i}{2R} \quad B = \frac{\mu_0 Ni}{l}$$

$$F = q\mathbf{v}B\text{sen}\theta \quad F = Bi\ell\text{sen}\theta$$

$$F = \frac{\mu_0 i_1 i_2 \ell}{2\pi d} \quad \theta = 0^\circ \text{ ou } 180^\circ \Rightarrow F = 0$$



mão direita

$$\phi = BA \cos\theta \quad \mathcal{E} = -\frac{\Delta\phi}{\Delta t} \quad \mathcal{E} = \ell Bv$$

$$R = \frac{m\mathbf{v}}{Bq} \quad T = \frac{2\pi m}{Bq} \quad \frac{V_1}{V_2} = \frac{n_1}{n_2} = \frac{i_2}{i_1}$$

Física "Moderna"

$$E = hf = \frac{hc}{\lambda} \quad hf = E_{lig} + E_C$$

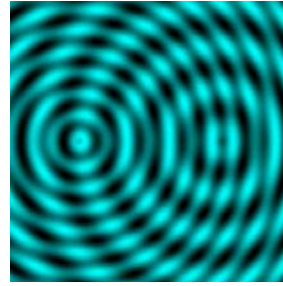
$$E = mc^2 \quad c = k \quad 1eV = 1,6 \cdot 10^{-19} J$$

Prefixos Gregos

- E = exa = 10^{15}
- T = tera = 10^{12}
- G = giga = 10^9
- M = mega = 10^6
- k = kilo = 10^3
- m = mili = 10^{-3}
- μ = micro = 10^{-6}
- n = nano = 10^{-9}
- p = pico = 10^{-12}
- f = fempto = 10^{-15}
- a = ato = 10^{-18}

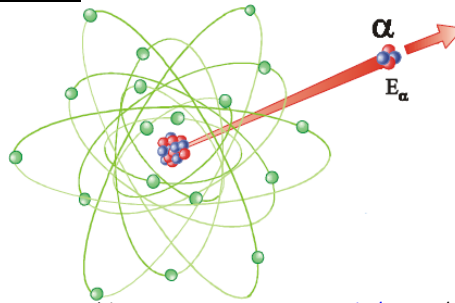
Interferência

Créditos: UFSC, www.ufsc.br/ em 25/05/07.

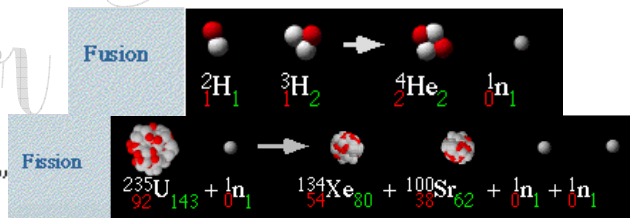
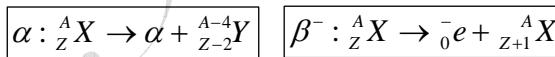
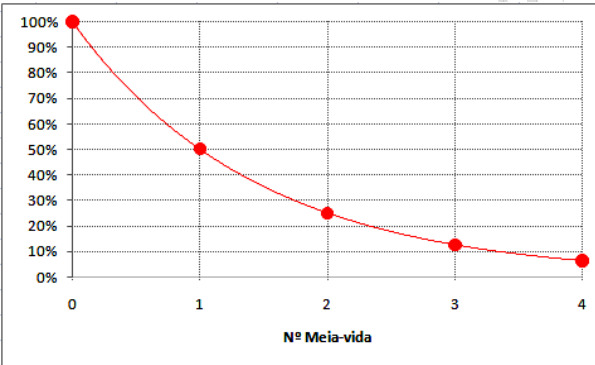


Decaimento Radioativo

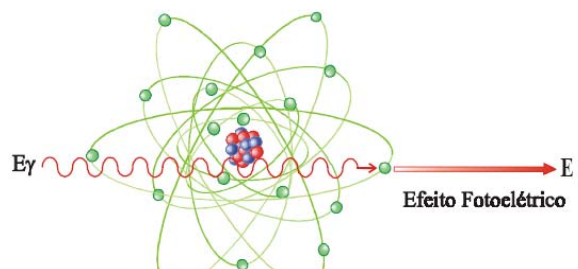
$$N = N_0 e^{-\lambda t} \quad T_{1/2} = \text{Meia-vida: reduz ao meio.}$$



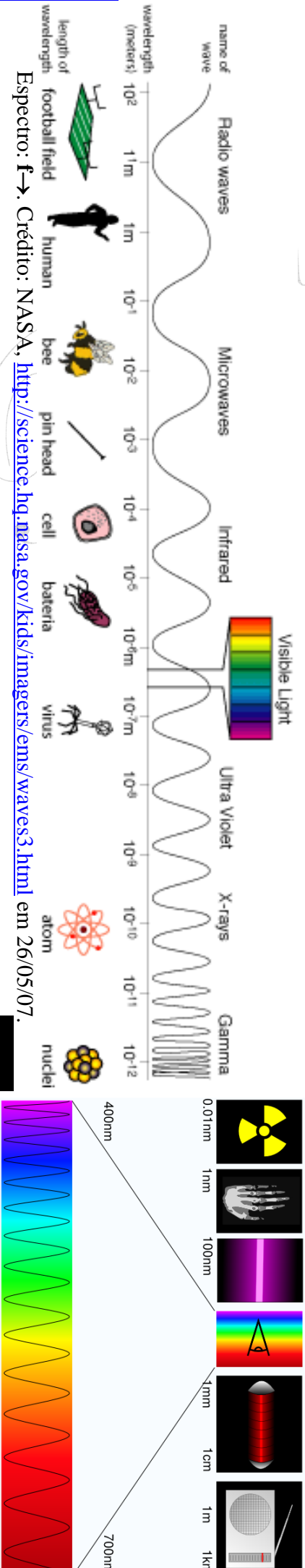
Decaimento α. Créditos: CNEM, www.cnem.gov.br/ em 25/05/07.



Física nuclear. Créditos: USP, www.usp.br/ em 25/05/07.



Efeito Fotoelétrico. Créditos: CNEM, www.cnem.gov.br/ em 25/05/07.



Crédito: Wikipédia, <http://pt.wikipedia.org/wiki/Imagem:Specire.svg> em 26/05/07.